

North Korean Long-Range Missiles: Development, Deployment, and Proliferation

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INTRODUCTION

During North Korea's 30-plus years of ballistic missile development, support from the former Soviet Union and China enabled it to develop basic ballistic missile technologies and foster technological manpower. And with close cooperative relationships with the Middle Eastern countries working in the background, Pyongyang was able to build a successful foundation for ballistic missile production. Now possessing approximately 700 ballistic missiles, North Korea has the largest ballistic missile capability in the Third world; and has come close to acquiring the capability of developing inter-continental ballistic missiles (ICBM).¹⁾ It also stands at the heart of the problem of international proliferation of ballistic

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1) U.S. National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," September 1999

Table 1. North Korea's Ballistic Missiles

	Range	Stages & Fuel	Payload	Status
Jwasong 5	300km	1,1iq	1,000kg	deployed
Hwasong 6	500km	1,1iq	770kg	deployed
Nodong	1300km	1,1iq	1,000kg	deployed
Taepodong 1	2500km	2,1iq	1,000kg	Test-fired
Taepodong 2	400-6000km	2,1iq	1,000kg	Developing

Source: ROK Ministry of National Defense, *White Paper 2000* (Seoul: MND, 2000).

missiles.

Upon successfully reproducing the SCUD-B missile in 1984, North Korea developed and field deployed Hwasong-5, with a range of 340 kilometers (km), in 1985; the Hwasong-6, with a range of 500 km, in 1989; and the 1300-km-range Rodong in 1993. The 2500-km-range Taepodong-1 missile was developed in 1998, and development of the 6000-km-range Taepodong-2 missile is currently under way (See Table 1). North Korea has a production capacity of four to eight Scuds monthly, both for export and for its own armed forces.²⁾

R&D PROCESS AND RELATED FACILITIES

Countries that develop nuclear weapons also develop ballistic missiles as the most ideal means of delivery, with almost no exceptions. Development of ballistic missiles and that of nuclear weapons are inseparable bedfellows, and this includes North Korea; it is difficult to think about North Korea's wholehearted efforts

[<http://www.cia.gov/cia/publication/nie/nie99msl.html>], pp. 7-8.

2) Response to Questions from Mr. Robert Einhorn Submitted by Senator Cochran, "North Korean Missile Proliferation," Hearing before the Subcommittee on International Security, Proliferation, and Federal Services of the Committee on Governmental Affairs, U.S. Senate, October 21, 1997, p. 1.

toward missile development without also considering its nuclear weapons development. After the mid-1970s, it started to shift its focus to atomic energy development with an aim to developing nuclear weapons, beginning with utilization of nuclear engineers from the Soviet Union who specialized in basic atomic energy technology. North Korea's nuclear weapons development became full-fledged in the 1980s with the independent construction of a chain of secret nuclear facilities, including nuclear reactor, and reprocessing facilities in the Yongbyun area. Pyongyang then launched full-scale ballistic missile development practically simultaneously with the development of nuclear weapons.

Aiming at nurturing technological and professional manpower for the development of special weaponry such as missiles, North Korea opened the Hamhung Military Academy in 1965. Indeed, departments that taught missile engines and designs are known to have been established at the Hamhung Military Academy.³⁾ It had already secured the foundation for basic missile technology and missile development with the former Soviet Union's cooperation in the 1960s by acquiring missile-related technology and fostering engineers specializing in the field. The North had its first contact with ballistic missiles when it introduced short-range FROG-5 missiles from the Soviet Union in 1968. Although the Soviet Union provided Pyongyang with ballistic missiles and related parts, there are no signs that the former provided production technologies to the latter. In fact, the Soviet Union was reluctant to provide North Korea with missiles whose range exceeded a certain limit.⁴⁾ North Korea-Soviet Union relations aggravated in the aftermath of the Sino-Soviet

3) "Statements by Col. Joo-hwal Choi and Young-hwan Ko," Hearing before the Subcommittee on International Security, Proliferation, and Federal Services of the Committee on Governmental Affairs, U.S. Senate, October 21, 1997.

4) U.S. Congressional Research Services, the Library of Congress, "Ballistic and Cruise Missile Forces of Foreign Countries," CRS Report for Congress, October 25, 1996.

Union conflict, and North Korea endeavored to acquire SCUD-type ballistic missile technology from China in the early 1970s.⁵⁾

North Korea adopted a military cooperation treaty with China in September 1971 for the introduction of modern weaponry and technology transfer, which included missile acquisition, transfer of missile research and development, and training of missile engineers. After the adoption of the treaty, China took the place of the Soviet Union in providing modern weaponry, including all types of missiles, and related technology to Pyongyang. Furthermore, China accepted in April 1975 the North's request to participate in the development of the DF-61 single-stage mobile tactical missile.⁶⁾

The DF-61, which China and North Korea attempted to develop jointly, was a 600-km-range tactical missile modeled after the Soviet Union's SCUD missiles. Although few North Korean engineers were involved in the DF-61 development process, their participation provided a precious opportunity for the North to acquire missile designing and other related technologies.⁷⁾ China's DF-61 development program, however, came to a premature end in 1978 due to the domestic situation.

Failing to quench its thirst for ballistic missile through China and the Soviet Union, North Korea set out to develop ballistic missiles on its own. In the background of Pyongyang's success in the independent development of ballistic missiles was its connection with Middle Eastern countries. Several SCUD missiles (R-17E) and missile launch platforms provided by Egypt in the late 1970s proved to be a decisive turning point for the reclusive country's development of ballistic missiles.

5) "North Korea's Missile Program" (in Korean), *Bukhan* (Seoul), November 1996, pp. 184-187.

6) Hua Di, *Asia-Pacific Defense Reporter*, September 1991, pp. 14-15.

7) Joseph Bermudez, "A History of Ballistic Missile Development in the DPRK," Monterey Institute of International Studies, Center for Nonproliferation Studies, *Occasional Paper*, No. 2, 1999, pp. 7-8.

North Korea and Egypt went on to adopt an agreement on the exchange of missile technologies and personnel. Taking advantage of its estranged relations with the Soviet Union at the time, Egypt provided SCUD missiles to North Korea, going so far as to breach its own treaty with Moscow.⁸⁾ By reverse-engineering a small number of SCUD missiles provided by Egypt, the North pushed ahead with the reproduction of these missiles. At the same time, with an aim to build the industrial infrastructure for ballistic missile development, it opened Factory No. 125 in Pyongyang, test-firing facilities in Musudan-ri, Hamkyung Province, and military R&D facilities in Sangun-dong.⁹⁾

By 1984, it had succeeded in reproducing SCUD-B and test firing the missile. The reproduction technology of SCUD, developed by North Korea, was then shared with Egypt. The success of the SCUD missile endowed North Korea with the ability to produce ballistic missiles, and it was none other than the Iran-Iraq War that provided Pyongyang the opportunity to furnish itself with effective missile development and mass production systems. With the outbreak of the Iran-Iraq War in 1980, Iran, imperiled by heavy SCUD missile attacks from Iraq, approached China and North Korea in order to procure ballistic missiles and acquire independent missile production technology. North Korea and Iran adopted a missile cooperation treaty in 1983, whereby Iran would supply the funds necessary for Pyongyang's missile development and North Korea would provide developed missiles and support Iran's establishment of a missile production foundation.¹⁰⁾ Accordingly, Iran has been provided with over 100 Hwasong-5 missiles, an upgraded model of SCUD-B, since

8) ROK Ministry of National Defense, *Defense White Paper 1996-1997* (Seoul: MND, 1997), pp. 96-97.

9) Bermudez, *op. cit.*, p. 10.

10) Anthony H. Cordesman, "Weapons of Mass Destruction in Iran," Middle East Studies Program, Center for Strategic and International Studies, April 28, 1998, pp. 1-7.

1987 and used these missiles in urban warfare against Iraq.¹¹⁾ Aside from Iran, other Middle East countries, such as Syria, Libya, Pakistan among others, became North Korea's primary customers as well as partners. Having secured both sufficient funds and stable markets in the Middle East, it was able to build a most efficient system for developing and mass producing ballistic missiles.

Since the successful reproduction of the SCUD missile in 1984, Pyongyang has continuously upgraded the capacity of its missiles. One outstanding characteristic that defines North Korea's development and improvement of ballistic missiles is its rapid development of missiles with a focus on extending the missile ranges. Its efforts to extend the missile ranges are a result of the Middle East's consumer preference well blended with Pyongyang's own strategic goal.

In 1985, North Korea developed Hwasong-5 missiles (ranges between 320 and 340 km), an upgraded model whose range was extended by 15 percent by applying some design changes to the 280-km-range SCUD-B missile. It embarked on full-fledged production of Hwasong-5 missiles in the following year. North Korea then developed 500-km-range Hwasong-6 missiles, whose extension of range saw a sharp increase, through the improvement of the Hwasong-5 missile system in 1989. The range of Hwasong-6 was extended by reducing the weight of warheads and making the airframes lighter.¹²⁾ North Korea successfully test fired Hwasong-6, and Hwasong-6 missiles began to be field deployed in 1991. North Korea had finally acquired the capability to put the entire Korean peninsula within its missile range.

Pyongyang was able to extend missile ranges considerably by changing the design of the basic SCUD model or reducing the weight of warheads and rockets. However, there were definite limits to extending missile ranges through these methods. Development of

11) *Jane's Intelligence Review*, May 1989, pp. 204-207.

12) Bermudez, *op. cit.*, pp. 14-16.

ballistic missiles with a range of 1000-km or more is inherently difficult merely with the basic designs and technologies of SCUD-type missiles.

Faced with this limit, North Korea launched the development of a medium-range ballistic missile called Rodong.¹³⁾ This missile, whose ranges are between 1000 km and 1300 km, was developed by scaling up the Hwasong-6 design by 150 percent, which then called for the development of new engines and guidance systems. To overcome such technological obstacles, it recruited missile experts from the Soviet Union. In October 1992, however, 32 engineers affiliated with the Makeyev Design Bureau, the office in charge of ballistic missile development, were checked, and prevented from leaving for North Korea just before their departure.¹⁴⁾ While the Rodong missile is of North Korean design and manufacture, it certainly seems to have benefited from some aspects of the Makayev SLBM program experience and design details.¹⁵⁾ According to the recent report, North Korea successfully developed a new medium-range ballistic missile based on Russian SSN-6 SLBM.¹⁶⁾

While it looks as if Pyongyang only scaled up the SCUD missile engines with the help of the Russian engineers, in effect, it seems to have developed new engines and guidance systems as well. In May 1993, North Korea test fired the Rodong missile in the direction of Japan's Nodo peninsula from a Musudan-ri launching site located in the East Sea (Sea of Japan). Visiting groups from Iran and Pakistan are known to have participated in this test.¹⁷⁾

The North's successful test firing of the Rodong missile showed that it had not only graduated from the stage of merely extending

13) *Chosun Ilbo*, March 20, 1994.

14) *Izvestiya*, January 27, 1994 in FBIS-SOV-94-019, January 28, 1994, pp. 8-9; KBS-1 Radio Network (Seoul), December 21, 1992.

15) Federation of American Scientists, "North Korea Special Weapons Guide: Rodong Missile," [<http://www.fas.org/nuke/guide/dprk/missile/nd-1.htm>].

16) *Chosun Ilbo*, August 5, 2004.

17) Bill Gertz, "North Korea as Nuclear Exporter?" *Washington Times*, June 8, 1994.

missile ranges via scaling up SCUD missiles, but that it had come to possess an independent missile development capability, including the development of engines. It is assessed that Pyongyang started the production of Rodong missiles before the test firing of the first Rodong missile, and that it completed the field deployment of these missiles around 1993. With the field deployment of Rodong missiles ranging more than 1300 km, the entire Japanese territory, including Okinawa, and main Chinese cities, such as Beijing and Shanghai, came within North Korea's missile range.

The country embarked on developing two types of long-range ballistic missiles in the early 1990s.¹⁸⁾ First of all, Taepodong-1 (TD-1) is a two-stage intermediate-range ballistic missile employing the existing launch vehicle, having a range of 2500 km and carrying warheads of approximately 1000 kg total. The first stage of TD-1 is a derivative of Rodong and the second stage, a derivative of Hwasong. Taepodong-2—a grand ICBM-grade ballistic missile embodying North Korea's great ambitions—is a 6000-km-range, two-stage missile employing a new type of derivative in the first stage and a Rodong derivative in the second.¹⁹⁾ Using TD-1 as a launch vehicle, it attempted to launch an artificial satellite into orbit in August 1998, to the utter shock of the West. The TD-1 satellite launch vehicle (SLV), named Kwangmyongsong-1, was launched from Musudan-ri, flew over Japan, and traveled approximately 4000 km. The TD-1 SLV is a three-stage rocket—a solid-fuel rocket attached to the two-stage TD-1 missile—and is loaded with a small satellite. Contrary to Pyongyang's announcement that it had successfully launched the artificial satellite into orbit using a multiple-stage rocket, the satellite actually failed to enter orbit due to lack of power.²⁰⁾

What made the test firing of Taepodong so shocking was that it

18) "North Korea's Missile Program," *op. cit.*, pp. 193-194.

19) "North Korea Special Weapons Guide: Taep'o-dong 2 (TD-2)," [<http://www.fas.org/nuke/guide/dprk/missile/td-2.htm>].

20) *Washington Post*, September 15, 1998.

signaled North Korea's development or possession of the core technologies needed to develop ICBM, such as multiple-stage separation, stable guidance of multiple-stage rockets, multiple-fuel systems, and so on. It proved that Pyongyang's missile technology was far more advanced than the West had anticipated, and that it was fast approaching the development of an ICBM.²¹⁾ Considering that North Korea commenced the production of the Rodong missiles around the time of the first test firing, and that it planned to field deploy these missiles with merely one round of testing, it is assessed that North Korea is in the process of deploying the TD-1 missiles.

Upon test firing TD-1, the North went ahead with its preparations to launch TD-2. Launch platforms were enlarged and rocket fuel delivered to Musudan-ri, the site of TD-1 test firing, for launching TD-2,²²⁾ and this seemed to signal that the launch of TD-2 around September 1999 was imminent.²³⁾ As a result of a dramatic breakthrough at the US-North Korea talks in Berlin in September 1999, however, North Korea declared a moratorium on the launch of long-range ballistic missiles, and at present, its TD-2 test-firing program is frozen. However, Pyongyang is probably developing the ICBM-grade TD-2 or possesses the prototype for test-firing.

North Korea's ballistic missile program has shown rapid progress in only 15 years, since it first reproduced a 280-km-grade SCUD missile in 1984. Moreover, Pyongyang also known to be

21) Robert D. Walpole, "Statements for the Record to the Senate Subcommittee on International Security, Proliferation and Federal Services on the Ballistic Missile Threat to the United States," February 9, 2000, Central Intelligence Agency, Speeches and Testimony, [http://www.cia.gov/cia/publicaffairs/speeches/archives/2000/nio_speech020900.html].

22) During the fall of 1998 and the spring of 1999, modifications were made to the TD-1 launching facility to make it capable of accommodating the flight-testing of the TD-2. See, Federation of American Scientists, "Taep'o-dong 2," pp. 4-7.

23) *New York Times*, July 4, 1999; U.S. DoD News Briefing, August 10, 1999. North Korean officials informed a Japanese envoy that North Korea was ready to launch a rocket. See, *Nihokezai Shimbun*, June 16, 1999.

conducting research on incorporating methods of global positioning satellites in order to increase the accuracy of missile guidance, thus freeing itself from the methods used on SCUD missiles in the 1960s.²⁴⁾

In North Korea, all defense-industrial matters fall under the responsibility of the 2nd Economic Committee of the Party Central Committee. It consists of eight general bureaus and one bureau (the 2nd National Science Institute), and one trading company for materiel. Each general bureau is responsible for certain types of weaponry, ranging from light arms to missiles to aircraft. Development and production of ballistic missiles fall under the auspices of the 4th General Bureau.²⁵⁾

The 4th General Bureau is charged with developing and producing all types of missiles, including ballistic missiles such as Hwasong-5/6, Rodong, TD-1/2, and anti-tank missiles, surface-to-air missiles and surface-to-ship missiles. Research Center No. 2 under the 4th General Bureau is responsible for the development of long-range ballistic missiles, and it has missile factories such as Mankyongdae (also known as Yakjeon) Electric Machine Factory, Defense Factory No. 7, among others, under its authority. Moreover, North Korea is known to have many missile-related production facilities, such as North Korea's largest underground factory, Factory No. 26 in Kanggye, Chagang Province; Factory No. 118 in Kaechon County, South Pyongan Province; and Factory No 125, which is known to be a rocket assembly line, in Pyongyang. Defense Factory No 7, located five miles away from the Mankyongdae Electric Machine Factory, is known to be producing ballistic missiles, including TD-1, and missile test equipment. North Korea's missile factories are, as is the case of other defense industrial facilities,

24) North Korean missile proliferation hearing before the Subcommittee on International Security, Proliferation, and Federal Services of the Committee on Governmental Affairs, U.S. Senate, October 21, 1997.

25) Federation of American Scientists, "North Korea Special Weapons Guide: Agency," [http://www.fas.org/nuke/guide/dprk/agency/2_econ_com.htm].

mostly located underground and are well-protected.

Missile-related trade, on the other hand, is dealt with in the 2nd Economic Committee and the Ministry of People's Armed Forces (MPAF). The MPAF's 15th Bureau is responsible for importing related equipment and parts, and the Maebong General Bureau (referred to as "Maebong Trading Company") is in charge of the import and export of missile parts.²⁶⁾ Missile exports fall under the "Yongkanson Trading Company" and the "Changgwang Trading Company" of the 15th Bureau and the 2nd Economic Committee respectively.

For North Korea, missile trade, which makes up the largest portion of its overall trade, is the primary wellspring of hard currency. Pyongyang earned approximately 580 million dollars during 1987-92 from exporting 250 missiles, related parts and technology. It is most likely earning 100-150 million dollars worth of foreign currency annually.²⁷⁾

CURRENT DEPLOYMENT AND LOCATION

In the late 1990s, North Korea attempted to restructure its missile unit, and created a missile division under the direct control of the MPAF's General Staff Department.²⁸⁾ The missile division consisted of the short-range FROG missile brigade which used to be under the Artillery Command; Hwasong (short-range ballistic missile) missile regiment; and Rodong (medium-range ballistic missile) missile battalion. This division also has administration and support units comprising the headquarters, communications battalion, missile

26) "Statements by Young-hwan Ko," Hearing before the Subcommittee on International Security, Proliferation, and Federal Services of the Committee on Governmental Affairs, p. 79.

27) Bermudez, *op. cit.*, p. 19.

28) *Ibid.*, p.23.

technical battalion, air defense battalion, engineer battalion and a nuclear-chemical company.

The Hwasong missile regiment's headquarters is located in Chiha-ri, which is 50 km north of the Demilitarized Zone (DMZ). It consists of four to five launch battalions and support units, and possesses Hwasong-5/6 missiles, 27 to 30 transporter-erector-launchers (TEL) and mobile-erector-launchers (MEL). The Hwasong missiles are deployed in the areas around the DMZ, such as Chiha-ri, which means North Korea could attack deep into the heart of the military and industrial facilities across the entire southern half of the Korean peninsula. In particular, it can attack the communications facilities even in the rear area, such as Pusan Port.

Pyongyang is known to have field deployed the Rodong missile battalion in the late 1990s. In fact, a base specially reserved for the Rodong missile battalion, which possesses nine TELs, was built in Sinori, Pyungbuk Province.²⁹⁾

Recently, to meet the demands of Rodong and Taepodong missile deployment, the North has been building new underground-turned missile bases and silos one after another.³⁰⁾ Most notable, new underground missile bases have been built in and near the North Korea-China border and along the east coast. The new bases concentrated on the east coast can be seen as mid- to long-range missile bases which target Japan and the US military bases in Japan. According to North Korean defector Rim Yong-sun, who worked for the Military Construction Bureau under the MPAF, North Korea has

29) *Joongang Ilbo*, March 6, 2001. North Korea has field deployed around 100 1300-Km-range Rodong missiles. *Chosun Ilbo* (Seoul), 26 October 1999. In the testimony to the Senate Armed Services Committee, Deputy Secretary of Defense Paul Wolfowitz stated that North Korea had deployed around 100 Rodong missiles. Paul Wolfowitz, Congressional Testimony on Ballistic Missile Defense to the Senate Armed Services Committee, July 12, 2001, U.S. DoD Defense Link, [<http://www.defenselink.mil/speeches/2001/s20010712-depsecdef.html>].

30) *Yomuuri shimbun*, January 3, 1999.

built several new bases to deploy long-range missiles.³¹⁾

An underground missile base was built in No-tong in Hwadae County, North Hamkyong Province, in 1988, where Rodong and Taepodong missiles are known to be deployed, targeting Japan. In fact, human inhabitation within a radius of 80 km of this base is forbidden due to security reasons. Moreover, a long-range missile base was built in Mayang-ri in Sinpo City, South Hamkyung Province, in the late 1980s. A missile base was also built in Chunggangjin, a North Korea-China border area, in 1995, and it is known to be targeting Okinawa. Because of the proximity of the base to North Korea's border with China and its mountainous topography, attack on the base is impossible unless the attacker crosses over into China. An underground missile base was also completed in Okpyongnodongja-ku, Munchon County, Kangwon Province, in 1998. A long-range missile base is currently under construction in Toksong County, South Hamkyung Province. These bases, too, target Japan and U.S. military bases in Japan.

Finally, a medium-range ballistic missile base is known to exist in the Sangwon area in Pyongyang.

FOREIGN CONNECTIONS

The most important factor that enabled North Korea to acquire the capability to independently develop ballistic missiles and enhance that capability was international connections related to ballistic missiles. Ballistic missile development in Third World countries such as Egypt, Iran, Pakistan, Syria, among others, is closely connected with North Korea, as it was through these countries that the North was able to secure the funds needed for ballistic missile development as well as stable markets. They, on the

31) Federation of American Scientists, "North Korea Special Weapons Guide: Missile Facilities," [<http://www.fas.org/nuke/guide/dprk/facility/missile.htm>].

other hand, not only received ballistic missiles but also obtained technologies and production facilities related to the ballistic missiles developed by North Korea, which enabled them to build their own production capabilities.³²⁾ As of the end of 1999, North Korea had exported 300 to 500 Hwasong-5/6 missiles to Iran, Libya, Syria and Egypt, and 24 to 50 Rodong missiles to Iran, Pakistan and Libya.³³⁾ Vietnam and Sudan are also known to have imported a small number of Hwasong-5/6 ballistic missiles between 1998 and 1999.³⁴⁾ Pyongyang, on the other hand, was able to acquire advanced missile technologies and parts through Iran, Egypt and Pakistan. Ironically, Egypt and Pakistan also have a close cooperative relationship with the West, the former Soviet Union and China in the defense industrial sector. Iran recently obtained new missile technology from Russia and China.³⁵⁾

Until the early 1990s, the pattern of international connections related to missile proliferation was North Korea's development of missiles with the funds provided by the Middle Eastern and South Asian states and sharing hardware and software of the missiles. It is believed, however, that since the mid-1990s, a rise in the ballistic missile development capability of Pakistan, Iran and Egypt has led to an evolving relationship between North Korea and these countries; in which all parties interact to improve the others' weak areas, thus resulting in very efficient system of connections on ballistic missile development. For instance, North Korea's Rodong, Pakistan's Ghauri, launched in April 1998, and Iran's Shehab-3, launched in

32) The international connection of North Korea's missile development is well described at Yun Duk-min, "North Korea's Missile Program," (in Korean) *Juyo Kukjemunje Bunsuck*, Institute of Foreign Affairs and National Security, ROK Ministry of Foreign Affairs and Trade, August 18, 1999.

33) Bermudez, *op. cit.*, pp. 16, 22-23.

34) Robert Karniol, "Vietnam Stocking up Scuds," *Jane's Defense Weekly*, April 14, 1999, p. 63; Bill Gertz, "North Korea Continues to Develop Missiles" *Washington Times*, October 28, 1999.

35) Cordesman, *op. cit.*, pp. 8-13.

July 1998, all look like the same model.³⁶⁾ That North Korea was able to field deploy approximately 100 Rodong missiles after only one round of test firing in May 1993 may be answered by the fact that the countries in the same loop share the data on the test firing of the same models. It is also believed that Shehab-4, whose development is now under way in Iran, and Pakistan's Ghaznavi are the same model as North Korea's TD-1, and Iran's Shehab-5 model identical to TD-2.³⁷⁾ Thus, it can be said that North Korea is pushing forward with the development of long-range missiles hand in hand with Pakistan, Iran and Egypt.

The origin of North Korea's ballistic missile technology derives from the SCUD missiles developed in the former Soviet Union, and there is no doubt that former Soviet Union and China were and are, the foundation of its missile technology development. The mass exodus of the former Soviet Union's professional engineers, who once worked in the defense industrial sector, is a corollary of Russia's economic difficulties and massive cuts in the defense budget after the dissolution of the Soviet Union. On the other hand, North Korea and China collaborated in the development of the DF-61 missile in the mid-1970s, but the joint project ended prematurely when China scrapped the development program. While China strongly denies supporting Pyongyang's ballistic missile development, Western nations believe that core parts of ballistic missiles, such as gyroscopes, accelerometers, special steel and state-of-the-art machinery needed to produce missiles are flowing into

36) U.S. Central Intelligence Agency, National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," September 1999, [<http://www.cia.gov/cia/publications/nie/nie99msl.html>]; David Wright, "An Analysis of the Pakistani Ghauri Missile Test of 6 April 1998," May 12, 1998, Federation of American Scientists, News, [<http://www.fas.org/news/pakistan/1998/05/980512-gauri.htm>].

37) Charles P. Vick, "North Korea Special Weapons Guide: Taep'o-dong 2 (TD-2)," Federation of American Scientists, [<http://www.fas.org/nuke/guide/dprk/missile/td-2.htm>], p. 5.

North Korea from China. In July 1999, former US Secretary of State Madeleine Albright expressed concern about sales of missile-related parts by China, such as special steel and so on, to North Korea.³⁸⁾

U.S.-NORTH KOREA MISSILE TALKS

The first country to deal with the problem of North Korea's missile development through negotiations was Israel. Beleaguered by Iran's and Syria's all-out efforts to purchase North Korea's medium-range ballistic missiles, Israel launched direct talks with Pyongyang, with Deputy Director-General Eitan Bentsur of the Israeli Foreign Ministry visited Pyongyang in November 1992 for talks with North Korean officials on the missile export issue.³⁹⁾

During the talks North Korea demanded economic cooperation worth approximately a billion dollars, development of a gold mine in Unsan, provision of thousands of trucks and so on, in return for halting its missile exports. However, the pressure from the United States, which was concerned about a possibly negative impact of these negotiations on its own set of nuclear talks with the North, brought the North Korea-Israel missile talks to a halt.

Preventing the proliferation of weapons of mass of destruction (WMD) has been a top priority for the United States since the end of the Cold War. A network of international connections has formed around WMD, and North Korea stands at the core.

The United States, realizing that international WMD control is impossible without curbing North Korea, has sought negotiations since the 1990s to induce the North to renounce its development of WMD. Washington, which believes North Korea's missile development poses a great threat not only to stability on the Korean peninsula, Northeast Asia and the Middle East, but also a grave

38) *Joongang Ilbo*, July 22, 1999.

39) *Reuters*, November 4, 1992.

threat to the international non-proliferation system, has listed control of its WMD development as an important policy task. Such a perception on the part of the United States was reflected in the U.S.-North Korea Geneva Agreed Framework signed in October 1994 to resolve the nuclear issue. Article 2, Clause 3 of the Geneva Framework stipulates: "As progress is made on issues of concern to each side, the U.S. and DPRK will upgrade bilateral relations to the Ambassadorial level." North Korea's missile issue was, indeed, one of the overriding issues of concern for Washington.⁴⁰⁾

With the adoption of the Geneva Agreed Framework and progress made in talks to provide light-water reactors (LWR) to North Korea, the United States began to see a certain degree of success. This trend brought Thomas Hubbard, U.S. Deputy Assistant Secretary of State for East Asian Affairs, to propose to the North in January 1996 talks to discuss the missile issue. Pyongyang accepted the proposal, and the US-North Korea missile talks commenced in Berlin in April 1996.⁴¹⁾ Six rounds of missile negotiations were held under the Clinton administration.⁴²⁾

At the missile talks, the United States stated that missile development and export posed a serious threat to the regional stability and international security, urging Pyongyang to halt its missile development and join the Missile Technology Control Regime (MTCR). North Korea, on the other hand, made its position clear that missile development was a matter of sovereign right and no one else's concern, and that joining the MTCR was solely up to Pyongyang. Regarding exports, however, North Korea said that since missile exports were a measure to acquire foreign currency, it

40) Yun Duk-min, *Negotiation History of North Korea's Nuclear Problem* (in Korean), (Seoul: Her Pub., 1995), pp. 109-114.

41) Evan Medeiros, *Arms Control Today*, February 1996, p. 25.

42) The process of U.S.-North Korea missile talks is described in Yun Duk-min, "US-North Korea Missile Talks," (in Korean) No. 2000-46 (Seoul: Institute of Foreign Affairs and National Security, 2000).

would consider renouncing the missile programs provided that political and economic compensation followed the renouncement. At the fourth talks in March 1999, the North demanded 10 billion dollars annually for the following three years in return for halting its missile exports.

After the test firing of the TD-1 missile in August 1998, suspicions arose over underground nuclear facilities in Kumchang-ri, and that preparations were under way in North Korea to launch Taepodong-2. Against this background, Congress strongly questioned President Clinton's North Korea policy. The Clinton Administration then launched a comprehensive overview of its policy toward North Korea by appointing William Perry as the policy coordinator.

Amid deepening concerns of both the U.S. government and its people over the possibility of Pyongyang's TD-2 launch, Perry proposed a package deal from the United States, Japan and South Korea to end economic sanctions, provide economic assistance and establish diplomatic relations with North Korea in exchange for an end to North Korea's missile and nuclear program.⁴³⁾ Despite that proposal, however, North Korea stepped up its preparations for the launch of Taepodong-2, a weapon that would put Hawaii and Alaska within its range, thus exposing the United States to its first direct military threat since the Cold War. This sent shock waves across the United States, and challenged the Clinton's engagement policy toward North Korea. In the end, it became inevitable for the Clinton Administration, then facing the 2000 presidential election, to provide North Korea with additional incentives to check farther missile launches. As a result of the high-level talks between Pyongyang and Washington in Berlin in September 1999, the United States lifted economic sanctions on North Korea (administered under the Trade with Enemy Act) and allowed trade with, and investments in the North. The North Korean Foreign Ministry, in return, declared a

43) Son Key-young, *Korea Times*, May 21, 1999.

moratorium on long-range missile launches.⁴⁴ With the U.S.-North Korea Berlin agreement as a catalyst, the Perry Report was announced on September 15, 1999.⁴⁵ The Perry Process sought to reach comprehensive and incremental agreements based upon an engagement policy. That is, if North Korea resolved the issue of WMD as required at each stage, South Korea, the United States and Japan would in turn decrease stage by stage pressures felt by North Korea, and thereby improve relations, provide economic cooperation and lift economic sanctions. However, the Perry Process did brace for a shift from path one, which sought to resolve North Korea's WMD issue based on 'dialogue and deterrence,' to path two, where engagement policy turned to a hardline policy should North Korea's WMD issue not be resolved in path one. The authorization of the Perry Report created an environment not only for an acceleration in the high-level US-North Korea talks and missile talks, but also for the reopening of Japan-North Korea talks on establishing diplomatic ties and inter-Korean dialogue. Meanwhile, the United States searched for the upgrading of a high-level negotiation channel in light of its previous experience in talks with North Korea, and promoted a U.S. visit by a high-level North Korean official.

The US-North Korea missile talks, which had moved along at a snail's pace, took a dramatic turn in July 2000 when Chairman Kim Jong-il and Russian President Vladimir Putin held a North Korea-Russia summit in Pyongyang. Chairman Kim Jong-il mentioned to Russian President Putin that North Korea would control missile development programs on the condition that the international community support its launch of satellites in its stead.⁴⁶ This

44) Ian Anthony, "Response to Proliferation: the North Korean Ballistic Missile Programme," in SIPRI, *SIPRI Yearbook 2000: World Armaments and Disarmament* (Oxford: Oxford University Press, 2000), pp. 657-659; *Chosun Ilbo*, September 13, 1999.

45) William J. Perry, "Review of United States Policy Toward North Korea: Findings and Recommendations," [<http://fukuoka.usconsulate.gov/wwwfperryrpt.pdf>].

provided the key to solving the problem of US-targeted long-range missiles, the biggest source of concern for Washington.

Cho Myong-nok, First Vice Chairman of North Korea's National Defense Commission, visited the United States in October 2000, and held talks with US President Clinton and others. The announcement of the "U.S.-DPRK Joint Communiqué," which was focused on the U.S. president's visit to North Korea, provided an important opportunity to mend the two nations' hostile relations for the first time since the Korean War.⁴⁷⁾ First Vice Chairman Cho Myong-nok delivered to President Clinton Kim Chong-il's handwritten letter expressing his intent to improve U.S.-North Korea relations. First Vice Chairman Cho also made a formal proposal that North Korea was indeed willing to abandon Taepodong missile development if the international community would give financial support to North Korea's artificial satellite launches into a third country. Furthermore, it acknowledged in the joint communiqué that resolution of the missile issue "would make an essential contribution to a fundamentally improved relationship between them, as well as and to peace and security in Asia-Pacific region."

U.S. Secretary of State Albright arrived in Pyongyang on October 23, 2000 to meet with Chairman Kim Jong-il to discuss pending issues between the two countries, such as defusing tensions on the Korean peninsula, opening diplomatic representation in both countries, resolving various missile issues, among others. In particular, the concept of North Korea's control of missile development and export in exchange for the international community's support in launching artificial satellites was discussed at the summit, and the two agreed to hold expert-level missile talks as soon as possible.⁴⁸⁾ As a follow-up to the Kim-Albright agreement, missile talks were held in Kuala Lumpur in November 2000. All

46) *Washington Post*, July 29, 2000; *Chosun Ilbo*, August 6, 2000.

47) *New York Times*, October 11, 2000; *Washington Times*, October 5, 2000; *New York Times*, October 13, 2000.

pending missile issues were discussed at the talks, such as the method of exchanging substitute missile launches for the halt of long-range missile development, compensation for the cessation of short- and medium-range missile exports, and so forth. On the issue of halting missile exports, North Korea demanded economic compensation in cash, but the United States proposed indirect support via provision of economic cooperation. In a press conference statement after the conclusion of the talks, Assistant Secretary of State Robert Einhorn, head of the U.S. delegation, announced, "The scope of our shared thoughts has expanded, but there are still significant issues that remain unresolved." His statement hinted that the atmosphere had not yet been created for President Clinton's visit to North Korea.⁴⁹⁾

North Korea's missile issue can be categorized as follows: long-range missile development; halt of short- and medium-range missile exports and of the missiles that have already been deployed. We can say that the fundamental direction of the U.S.-North Korea missile talks-resolution of North Korea's missile issue, the crux of which is compensation in exchange for a freeze of missile development and export, is taking root. It looks as though the future U.S.-North Korea missile talks will work specifically toward laying a comprehensive framework for North Korea's renouncement of missile development and export in return for compensation.

CONCLUSION: POLITICO-MILITARY IMPLICATIONS

North Korea's missile development can be seen as having derived primarily from a military motivation. Pyongyang aims to

48) *New York Times*, October 25, 2000; U.S. State Department Briefing, October 27, 2000.

49) "Einhorn Statement Nov. 3 on North Korea Missile Talks," U.S. Department of State, Office of the Spokesman, November 3, 2000.

expand its capability to wage war on the Korean peninsula through the development and deployment of long-range missiles that can carry WMDs. The blitzkrieg it launched in 1950 during the Korean War failed, because it could not prevent swift intervention from the U.S. Forces based in Japan. Learning a lesson from this experience, the North is actively developing ballistic missiles that can attack the rear area of South Korea as well as U.S. military bases in Japan. As far back as 1965, on the occasion of the opening of the Hamhung Military Academy, President Kim Il-sung commented: "If a war breaks out, the U.S. and Japan will also be involved. In order to prevent their involvement, we have to be able to produce rockets which fly as far as Japan."⁵⁰ By field deploying Rodong missiles in the mid-1990s, North Korea gained the ability to attack all U.S. military bases in Japan. Also, if TD-1 intermediate-range ballistic missiles, one of which was test fired in August 1998, are deployed, each and every U.S. military base in Guam and East Asia will come within North Korea's ballistic missile range.

Now that it has missiles that put all of the Korean peninsula and Japan within its missile range, North Korea's strategic goals has been achieved for the time being. Its development of ICBM-grade missiles, on the other hand, can be seen as stemming from domestic political considerations and the need for acquiring foreign currency and strengthening its negotiating power vis-à-vis the United States. In particular, it can be said that the North's domestic political considerations are playing a role in its unabated development of long-range missiles, which demand a considerable amount of money. This includes attempts to launch artificial satellites, despite grave economic difficulties and food shortages. In the midst of the worst economic difficulties and food shortages ever, the Kim Jong-il regime has proposed the vision of "Kangsong Daeguk," meaning a powerful

50) Statements by Col Joo-hwal Choi and Young-hwan Do before the Subcommittee on International Security, Proliferation, and Federal Services of the Committee on Governmental Affairs.

nation. Specifically, the regime stresses the gun barrel, ideology and science and technology as the three main pillars for building a powerful nation. The crux of science and technology is none other than the development of long-range rockets. Development of long-range missiles can be seen as an important mechanism for mobilizing the people's support for the regime by elevating the authority of the nation and boosting their spirit despite grave economic straits and food shortages.

North Korea's missile development does not just threaten security on the Korean peninsula and in Northeast Asia; The North stands in the center of worldwide proliferation of ballistic missiles. Its export of 1300-km-range Rodong medium-range ballistic missiles to Iran and Libya poses a threat not only to the Middle East but also to Europe. In particular, efficient connections are being built among North Korea, Egypt, Iran and Pakistan for joint development of long-range missiles, which allows them to cooperate and overcome technological difficulties. The cooperative relationship between North Korea and Pakistan surrounding WMD development is also an element spurring an arms race between India and Pakistan. Furthermore, there is a danger that North Korea's provision of ballistic missiles to Africa's Sudan and Southeast Asia's Vietnam could trigger a new round of missile arms races.

North Korea's development of long-range missiles has stirred intense international controversy over missile defense. The test firing of the three-stage Taepodong missile that flew over the Japanese islands in August 1998 not only shocked Japan but also the United States; this indeed backed up the assessments in the Rumsfeld Report that North Korea would have the capability to develop by the early 2000s an ICBM that can attack the US mainland.⁵¹⁾

The US Department of Defense announced in January 1999 its

51) Donald H. Rumsfeld, *et al.*, "Executive Summary of the Report of the Commission to Assess the Ballistic Missile Threat to the United States," [<http://www.fas.org/irp/threat/bm-threat.htm>].

plan to deploy a limited National Missile Defense (NMD) system by 2005, the projected year by which North Korea is expected to be able to develop the ICBM. By legislating the “National Missile Defense Act” in July 1999, the United States also decided on early deployment of the NMD system as soon as technological problems are solved. Japan, too, has commenced joint research with the United States to develop the Theater Missile Defense (TMD). However, the promotion of the NMD and TMD projects by the United States and Japan is rousing adamant opposition from Russia and China.